LXIX. *A Diſcourſe on the Uſefulneſs of Inoculation of the horned Cattle to prevent the contagious Diſtemper among them. In a Letter to the Right Hon.* George *Earl of* Macclesfield, *P. R. S. from* Daniel Peter Layard, *M. D. F. R. S.*

My Lord,

Read Feb. 2. 1758. THE honour you have done me, in condeſcending to peruſe my Eſſay on the contagious Diſtemper among the horned Cattle, claims my moſt reſpectful thanks; and I am no leſs obliged to your Lordſhip for the juſt remark you made, "That before inoculation could be practiſed on the horned Cattle, it is neceſſary to bring "proofs, that this diſeaſe is not ſuſceptible more "than once; and alſo aſſurances, that a recovery "from the diſtemper by inoculation guards the beaſt "from a ſecond infection."

An intire conviction of the analogy between this diſeaſe and the ſmall-pox would not permit me to omit mentioning the great advantages, which muſt ariſe from inoculation; and therefore, my Lord, I recommend its uſe: nor do I find any reaſon to alter my opinion, after having carefully read over what has been publiſhed, and made the ſtricteſt inquiry I was able in ſeveral parts of Great Britain.

I ſhall, in the conciſeſt manner poſſible, ſubmit the following particulars to your Lordſhip's conſideration, and the learned Society, over which you ſo deſervedly preſide.

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The Marquis de Courtivron, in two memoirs read before the Royal Academy of Sciences in the year 1748, and publiſhed by that learned body, relates the obſervations he, together with Monſieur Pelverſier de Gombeau, formerly ſurgeon to the regiment de la Sarre, made on the riſe, progreſs, and fatality, of the contagious diſtemper at Iſſurtille, a town in Burgundy; to which are added experiments they made, by application, digeſtion, and inoculation, towards communicating the diſeaſe; and concludes from the failure of theſe attempts, that the diſtemper can only be communicated from one beaſt to another. Beſides, notwithſtanding the Marquis obſerves (1) the regularity of the illneſs, the critical days, on the ſeventh and ninth, and particularly that all ſuch as recovered had more or fewer puſtules broke out in different parts of the body; yet (2) he will not allow of Rammazzini's opinion, of the analogy between this diſtemper and the ſmallpox, nor that it is an eruptive fever; but ranks it as a plague.

But the Marquis goes ſtill farther. He poſitively ſay, (3) "That in the preceding years, in the pro-"vinces of Breſſe, Maconnois, and Bugey, ſome pri-"vate perſons had ſuffered by buying cattle reco-"vered from the diſtemper, which had, at that time, "the puſtules remaining on them: which cattle had "the diſtemper afterwards." Nay, he adds that "even after recovering twice, a third infection has "ſeized and killed many."

(1) Memoires de l'Acad. des Sciences, anno 1748. p. 326.
(2) Ibid. p. 338.
(3) Ibid. p. 337.

No wonder, my Lord, that ſuch poſitive aſſertions ſhould ſtagger, and cauſe the practice of inoculation not to be received, till the nature of the diſeaſe be abſolutely determined, and facts prove the contrary of what has been aſſerted.

In a matter of ſo great importance to every nation, it were to be wiſhed, that the Marquis de Courtivron had produced atteſted obſervations of theſe ſecond and third infections: for tho' a nobleman of his rank, character, and great abilities, would not willingly impoſe upon the world; yet it may happen, that he may have received wrong informations.

As to the nature, riſe, progreſs, and fatality, of this diſtemper at Iſſurtille, it appears to be the ſame diſeaſe as raged in theſe kingdoms. All the ſymptoms agree, as deſcribed by Rammazzini, Lanciſi, the Marquis, and in my Eſſay. A diſtempered beaſt gave riſe to the three infections. The illneſs was every-where the ſame in Italy, France, and Britain; and either terminated *fatally* on the fourth or fifth day, when a ſcouring prevented the ſalutary eruptions, or in ſome caſes by abortion; and on the ſeventh or ninth *favourably*, when the puſtules had regularly taken their courſe. Tho' the Marquis did not obſerve, that any particular medicines were of uſe, he ſays, that in general acids were beneficial, eſpecially poor thin wines ſomewhat ſour; and that the diſtempered beaſts were all fond of theſe acids (4).

The fatality was likewiſe the ſame, as will appear from the Marquis's tables. Of 192 head of cattle, 176 died. The mortality was chiefly among the fat

(4) See my Eſſay on the contagious Diſtemper, p. 70.

cattle,

cattle, cows with calf, and young ſucking or yearling calves; and of the ſurviving ſixteen, only two calves out of ſeventy-ſeven lived, and theſe two, with ſeven other beaſts of the ſixteen, eſcaped the infection, tho' conſtantly among the diſeaſed: ſo that it is plain,

Of 192 beaſts, - - 176 died
7 recovered
9 eſcaped the infection.

192

The mortality was as conſiderable in theſe kingdoms.

Whoever will compare the appearances, progreſs, and fatality, of the ſmall-pox, with what is remarked by authors of authority, as Rammazzini and Lanciſi, and other obſervers, relative to the contagious diſtemper among the horned cattle, will not be at a loſs one moment to determine, whether this diſeaſe be an eruptive fever, like unto the ſmall-pox, or not.

Now if, as the Marquis has granted in both his memoirs (5), it be a general obſervation, that an eruption of puſtules on ſome parts of the body, regularly thrown out, digeſted, and dried, is the means uſed by nature to effect the cure; and that in general the morbid matter does not affect the parotid, inguinal, or other glands, nor produce large carbuncles and abſceſſes, as the plague does: Nay more, ſince it is obſerved by the Marquis, that the difference between the contagious diſtemper of 1745 and 1746, and of 1747 and 1748, was, that in the former the

(5) Pag. 143. and 338.

ſalutary eruptions appeared, but in the latter were, as he juſtly apprehends, checked by the exceſſive cold weather; and ſhould it appear, that by inoculation the ſame regular eruptive fever has been produced, with every ſtage, and the ſame ſymptoms as ariſe in the ſmall-pox; the nature of this diſtemper will then be aſcertained.

I ſhall now proceed, my Lord, to lay before your Lordſhip and the Society the accounts I have received relating to the infection and inoculation of the cattle, and make ſome obſervations on the experiments made at Iſſurtille.

So long, my Lord, as the diſtemper has raged in Great Britain, not one atteſted proof has been brought of any beaſt having this diſeaſe regularly more than once. I make no doubt but theſe creatures may be liable to eruptions of different kinds; but as all ſorts of eruptions, ſays Dr. Mead (6), are not the ſmall-pox, nor meaſles, ſo every puſtule is not a ſign of the plague. Thro' ignorance, or fraud, perſons may have been deceived in purchaſing cattle, and have loſt them, as well in England as in the provinces of France mentioned by the Marquis; but until a ſecond infection be proved, the general opinion muſt prevail in this caſe, as in the ſmall-pox: for tho' many have inſiſted on the ſame thing with regard to the ſmall-pox, yet a ſingle inſtance, properly vouched and atteſted, has never been produced, either after recovery from the natural way, or from inoculation; unleſs what is frequently the caſe with nurſes and others attending the ſmall-pox, that is, puſtules

(6) Eſſay on the Plague.

breaking

breaking out in their arms and face, be allowed as the ſigns of a ſecond infection.

The farmers and graziers in Huntingdonſhire, Cambridgeſhire, Lincolnſhire, Kent, and Yorkſhire, from whence I have written teſtimonies, all agree, that they never knew of a beaſt having the contagious diſtemper more than once. In this county particularly, Mr. J. Mehew, the farmer mentioned in my Eſſay, has now among his ſtock at Godmancheſter *eight cows*, which had the contagious diſtemper the firſt time it appeared in Godmancheſter in 1746. It returned in 1749, 1755, and 1756; the two laſt not ſo generally over the town as the two former years. All theſe four times Mr. Mehew ſuffered by the loſs of his cattle; yet thoſe *eight cows*, which recovered in 1746, remained all the while the diſtemper was in the farm the three years it raged, were in the midſt of the ſick cattle, lay with them in the ſame barns, eat of the ſame fodder, nay of ſuch as the diſtempered beaſts had left and ſlabbered upon, drank after them, and conſtantly received their breath and ſteams, without ever being in the leaſt affected. Is not this a convincing proof? If in general the cattle be ſuſceptible of a ſecond infection, how comes it, that not one of theſe *eight* cows were affected?

In the years abovementioned the diſtemper ſpared no beaſt, but ſuch as had recovered from that diſeaſe: and this is confirmed to me by Mr. Mehew's father and brother, all the chief farmers of Godmancheſter, and is the opinion of all the farmers and graziers in Huntingdonſhire, who are ſo thoroughly convinced of there being no ſecond infection, that they

they are always ready to give an advanced price for ſuch cattle as have recovered from the contagious diſtemper.

The Rev. Mr. Scaife, aſſiſtant to the Rev. Dr. Greene, Dean of Saliſbury, in his pariſh of Cottenham, Cambridgeſhire, acquaints me, that the farmers in that neighbourhood loſt, in 1746 and 1747, twelve hundred head of cattle, in 1751 four hundred and ſeventy; and tells me, that Mr. Ivett, Sayers, Moor, Dent, Lawſon, chief farmers at Cottenham, Mr. Taylor, Sumpter, and Matthews, of his own pariſh of Hiſton, and the farmers of Wivelingham alias Willingham, unanimouſly declare, they never had one inſtance of a beaſt having the diſtemper twice.

Mr. Thorpe, a farmer and grazier near Gainsborough in Lincolnſhire, has had beaſts recovered from the diſtemper, which have herded with cattle fallen ill afterwards, and never met with a ſingle inſtance of a ſecond infection.

Mr. Loftie, an eminent ſurgeon at Canterbury, has inquired for me of the farmers and graziers in that part of Kent, and about Romney-Marſh; and from whence no belief of a ſecond infection can be had.

The Rev. Dr. Fountayne, Dean of York, writes me word, that no beaſt has been known, in his neighbourhood, to have had the diſtemper twice. And ſeveral perſons from that county, and others, have told me the ſame thing.

If the above teſtimony of perſons of character and veracity, together with the concurrent perſuaſion of farmers in general, be allowed of, it muſt be determined, that there is no inſtance of a ſecond infection. Suppoſing now it ſhould appear, that this diſtemper

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is regularly, as in the natural way, tho' in a milder manner, produced by inoculation, and that inoculation ſecures a beaſt alſo from a ſecond infection; then undoubtedly inoculation will be recommendable.

The very few trials made in England, and thoſe not with the greateſt exactneſs or propriety, will yet ſerve to put this matter out of all doubt.

The Rev. Dean of York had five beaſts inoculated, by means of a ſkein of cotton dipped in the matter, and paſſed thro' a hole, like a ſeaton, in the dew-lap. Of theſe five, one cow near the time of calving died: the other four, after going thro' the ſeveral ſtages of this contagious diſeaſe, recovered; two of which, being cows young with calf, did not ſlip their calves. All four have herded with diſtempered cattle a long while, and never had the leaſt ſymptom of a ſecond infection.

Mr. Bewley, a ſurgeon of reputation in Lincolnſhire, inoculated three beaſts two years old, for Mr. Wiggleſworth of Manton, in the dew-lap, and with *mucus* from the noſtrils. All three had the regular ſymptoms of the contagious diſtemper in a mild manner, recovered, and tho' they herded a twelvemonth after with five or ſix diſtempered beaſts, they never were the leaſt affected. Mr. Bewley alſo declared to Mr. Thorpe, that there never was one inſtance produced, that he knew of, of a ſecond infection.

Since it is plain, that notwithſtanding neither well-digeſted *pus* was made uſe of, nor inciſions made in the propereſt places, and it may be ſuppoſed few medicines were given; yet inoculation ſucceeded ſo

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as to bring on the diſtemper in a regular and mild manner, as appears by the cows with calf not ſlipping their calves. One may fairly conclude, that in this contagious diſtemper, like unto the ſmall-pox, the practice of inoculation is not only warrantable, but much to be recommended.

But how comes it then, that neither by application, digeſtion, nor inoculation, the diſtemper was not communicated in France?

The Marquis ſays, that this diſtemper is not communicated but from one beaſt to another immediately. I muſt beg leave to ſay, that to my knowlege the diſtemper in February 1756 was carried from the farm-yard, where I viſited ſome diſtempered cattle, to two other farm-yards, each at a conſiderable diſtance, without any communication of the cattle with each other, and merely by the means of ſervants going to and fro, or of dogs.

The experiments made on four beaſts, by tying over their heads part of diſtempered hides, or pieces of linen and woollen cloth or ſilk, which had received the breath and ſteams of dying cattle, ſerve to ſhew, by the bullock's forcing off the cloth tied about him, that the putrid ſtench was diſagreeable to him; but that neither his blood, nor that of the other three beaſts, was then in a ſtate to receive the infection.

With regard to the puſtules, which the Marquis relates were mixed with oats and bran, or diſſolved in white wine; the diſtempered bile, which was mixed with milk; milk taken from diſeaſed cows; water, in which part of a diſtempered hide had been ſteeped; and the precaution taken to force theſe

mixtures into the paunch of calves, by means of a funnel, whoſe end was covered with a piece of raw diſtempered ſkin, that the beaſt might both ſwallow and ſuck in the diſeaſe. All theſe experiments could have no other effect than what followed; which was, that the acrimony of the diſtempered bile created firſt a *nauſea*, and then produced a violent ſcouring, which killed the beaſt, leaving marks of its irritation on the inteſtines.

The practice of inoculation is but lately followed, and even now but little known, in the provinces of France. Its advantages have not long ſince been ſtrangely diſputed at Paris. In the caſe of inoculating cattle, inſtead of a ſlip of raw hide taken from a beaſt juſt dead, or putting a puſtule into the neck, they ſhould either have paſſed in the dewlap cotton or ſilk dipped in well-digeſted *pus*, or have inſerted in proper inciſions cotton-thread or ſilk ſoaked with *pus* either on the ſhoulders or buttocks; the true way of inoculating in the Engliſh manner. Some perſons have indeed thought, that to inoculate with the blood of the infected would anſwer the intention; but moſt of the modern practitioners chuſe to depend on digeſted matter.

Several conſtitutions will not receive infection, let them be inoculated ever ſo judiciouſly. A Ranby, a Hawkins, a Middleton, and other inoculators, will tell us, that the inciſions have ſometimes ſuppurated ſo much, and puſtules have appeared round the edges of the wound, without any other particular marks of the diſeaſe; and yet the patient has never had the ſmall-pox afterwards. The Marquis mentions an inſtance ſomewhat of the ſame kind in his firſt Memoir, p. 147.

The examination of theſe very important and intereſting particulars has, I obſerve, drawn me into a prolixity, which I fear may prove tedious to your Lordſhip: but ſhould I have removed all doubts, and brought convincing proofs of the abſurdity of fearing a ſecond infection; ſhould I have ſhewn inoculation to be a neceſſary practice, and that the contagious diſtemper may be communicated more ways than one; I hope your Lordſhip will excuſe the length of this letter. I ſhall only add my earneſt wiſhes, that the legiſlature may, by effectual means, prevent the importation of diſtempered cattle and hides into theſe kingdoms; the only means of naturalizing and perpetuating a dreadful diſtemper, now, thank God! much decreaſed among us.

I am, with the greateſt reſpect,

My Lord,

Your Lordſhip's

Moſt humble and moſt obedient Servant,

Huntingdon,
26 Nov. 1757. Daniel Peter Layard.

LXX. *Trigonometry abridged.* *By the Rev.* Patrick Murdoch, *A. M. F. R. S.*

Read Feb. 2, 1758. THE caſes in trigonometry, that can properly be called different from one another are no more than *four*; which may be reſolved by *three* general rules or theorems, expreſſed